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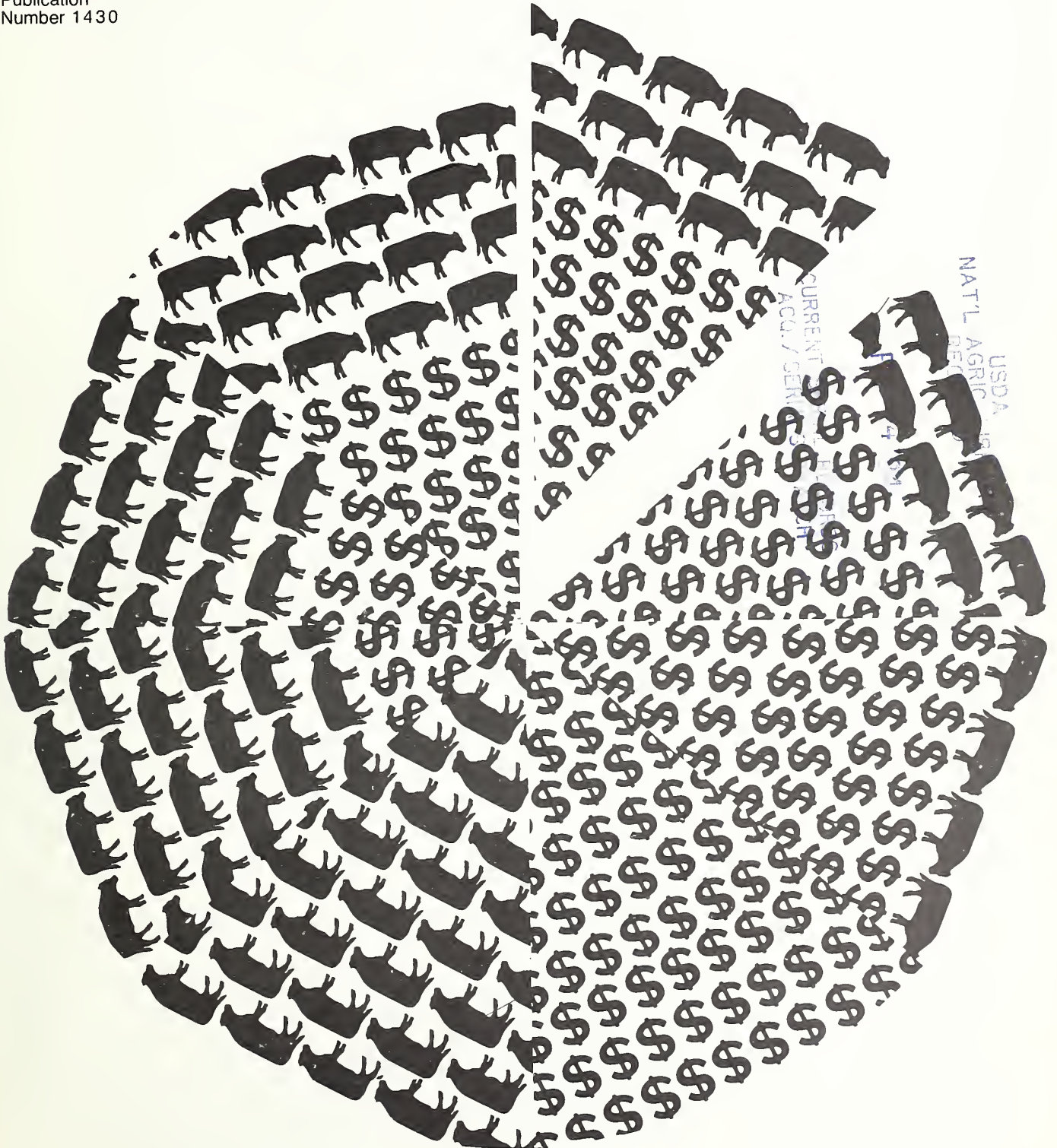
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Cattle Cycles: How to Profit From Them



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PREFACE

A conscientious cowboy or rancher can conquer the cattle production and price cycle. To do so one must (1) understand the characteristics of the cycle, (2) learn to recognize each stage of the cycle as it unfolds, and (3) develop and implement strategies that will maximize earnings during good years and minimize losses during poor years.

The first section of this report helps the producer better understand the causes and characteristics of the cattle cycle.

The second section provides several numerical indicators that will furnish valuable clues as to what can be expected in the way of cyclical changes and will give advance warning of the timing and probable severity of the next sharp downturn.

The third section outlines specific strategies that will maximize earnings and minimize losses for feeder cattle producers through both "bust" and "boom" phases of the beef price cycle.

The following is a broad question not specifically dealt with in this study of the beef industry: Can cattle producers collectively control the cattle cycle? The

tentative answer to this is: No, the cattle cycle cannot be controlled, but it can be moderated slightly as more and more individual cattle producers learn to adjust their operations in a counter-cyclical fashion. However, beef organizations and local, state, and Federal Government agencies may want to try to influence beef producers to better match beef production to beef demand at cost-covering prices in the future. To do this very effectively would require (1) an understanding of the normal growth in beef demand, (2) an appreciation of the relevant beef production costs, and (3) a method of projecting probable beef demand and the cattle numbers just sufficient to match this demand at satisfactory market-clearing prices.

Each individual beef producer is encouraged to study the material in this report and to develop management strategies that can be used to conquer the next cattle cycle.

Paul R. Hasbargen, Chairman
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March 1983

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The Extension-Industry Beef Resource Committee is composed of industry and Extension Service leaders and serves as a planning body for national Extension programs to meet the needs of cattle producers.

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CATTLE CYCLE CHARACTERISTICS

The censuses of 1840, 1850, and 1860 provided the first published estimation of cattle numbers in the United States. Cattle numbers totaled 25.6 million head in 1860. It was not until 1867 that cattle numbers became available on an annual basis. Data since that time show eight cycles in cattle numbers as indicated in Table 1.

Peaks in numbers occurred in 1890, 1904, 1918, 1934, 1945, 1955, 1965, and 1975. The last four cycles have averaged about 10 years in length--peaking in the middle of each decade. Each cycle contains two phases--the upswing or accumulation phase and the downswing or liquidation phase. The cycles have shown a tendency to become shorter, mainly in the liquidation phase--until the last

one. Previously, the liquidation phase lasted 6 to 10 years, but it dropped to 2 years before going back to 4 years in the latest cycle. Apparently, the growing demand for beef during the 1950's and 1960's shortened the length of the liquidation phases. The expansion phase has remained at 6 to 8 years for all cycles since the turn of the century. A 6-year expansion in the new cycle would result in another mid-decade peak in numbers.

The cyclical aspect of cattle numbers has been confined almost entirely to the beef sector as dairy cattle numbers have declined almost continuously since the mid-1940's. Thus, the cattle cycle can more properly be called a beef cattle cycle.

Table 1. Cycles in total cattle numbers in the United States, 1867 to present

Year	Low point in cycle	Upswing duration years	Year	Peak in cycle	Downswing duration years
1867	28,636,000	23	1890	60,014,000	6
1896	49,205,000	8	1904	66,442,000	8
1912	55,675,000	6	1918	73,040,000	10
1928	57,322,000	6	1934	74,364,000	4
1938	65,249,000	7	1945	85,573,000	4
1949	76,830,000	6	1955	96,592,000	3
1958	91,176,000	7	1965	109,000,000	2
1967	108,783,000	8	1975	131,826,000	4

Source: "Century of Agriculture in Charts and Tables," Statistical Reporting Service, USDA, Agricultural Handbook 318, July 1966, p. 35 and revisions.

Causes of the Cattle Cycle

Many changes have taken place in the cattle industry during the past 100 years, but the cattle cycle has continued to persist. It has persisted simply because it is based on two constants: (1) the profit motive which prompts producers to make production decisions on the basis of present profits; and (2) the biological process which necessitates several years for the results of production decisions to appear as changes in the number of cattle slaughtered.

The alternating economic "booms" and "busts" that have accompanied cycles in cattle inventories have been a matter of great concern to the beef cattle industry. The cattle cycle is the single most important force in terms of beef prices and producer incomes. Incomes vary from prosperity to bankruptcy levels as prices of slaughter cattle and, thus, feeder cattle generally vary inversely to beef production levels. The question arises as to why the industry cannot attain a sustainable growth pattern that would prevent these economic gyrations. The difficulty of maintaining a steady growth pattern stems from the many forces that contribute to the nature of the cattle cycle.

As noted above, both the length of time necessary for the results of production to cause changes in cattle numbers and the tendency of producers to plan on the basis of current profits help to generate the cyclical swings in cattle numbers. The beef industry is not a self-contained economy. It depends on the level of general

business activity, per capita disposable incomes, and changes in consumer preferences as well as in climatic conditions. Since it was first measured in 1955, expenditures per person for beef have varied by only a little from 2.5 percent of consumer income. This implies that the price of beef depends on the level of economic activity as it relates to income and to the current supply of beef.

In the past, herd growth often accelerated during periods of strong economic growth. The herd buildup in the early 1970's roughly coincided with the strong economic growth and rising consumer incomes of that period. Herd liquidation has often occurred during recessions or periods of marginal growth in the economy. The most notable cases were the liquidations in the 1930's and those of the postwar slumps following World War II, the Korean conflict, and the Vietnam War. Finally, droughts helped bring deeper cutbacks in herd numbers in the 1930's, the 1950's, and the 1970's than would have occurred given more normal feed and pasture production.

The key characteristics of the beef industry that generate cattle cycles are as follows: (1) the price of beef is determined largely by the demand for and the supply of beef; (2) beef producers--both cattle feeders and feeder producers--tend to base their expectations of future prices on current and immediate past prices; but, (3) it takes 2 or 3 years for a change in production plans to be reflected in a change in cattle slaughter; meanwhile, (4) beef marketings actually move in the direction opposite to that desired.

The biological process of beef production is a significant factor in the pattern of beef cycles. It takes about 3 years for beef cattle marketings to start moving in the desired direction, compared to only 1 year for hogs.

Thus, a cattle cycle is three times as long as a hog cycle--9 to 12 years as compared to a 3- to 4-year hog cycle.

Cow-calf operators are at the beginning of the production process, but they are at the "end of the line" as far as price reverberations are concerned. That is, they are the most vulnerable to the associated financial "booms" and "busts" of a cattle cycle. They are the final recipients of the losses that occur as lower slaughter cattle prices and feeding losses are passed through the marketing system.

Conclusions of a survey of Oklahoma ranchers taken in August 1974 indicate that the philosophy and behavior of cow-calf producers make them even more vulnerable to the cattle cycles. ^{1/} The conclusions indicated that:

1. Most cow-calf producers are not well informed about inventory changes or new developments in the industry on a national scale.

^{1/} The Beef Cycle of the 1970's, Keith Kendell and Wayne Purcell, Agricultural Experiment Station Bulletin B-721, Oklahoma State University, March 1976.

2. Most cow-calf producers are reluctant to admit that their collective deviations to increase production usually are the major cause of cyclically lower prices. Instead, they blame low prices on other factors--the weather or the Government. (Another study found that "imports" were perceived to be a major problem source.)
3. Most cow-calf producers are unrelenting optimists and maintain or continue to expand herds even after economic conditions first signal the opposite action is needed.

Three Characteristic Stages of a Cattle Cycle

Normally, a cattle cycle is broken into two stages for analysis--the expansion stage and the liquidation stage. However, Paul Hasbargen and Kenneth Egertson found that a better understanding of the cattle cycle can be developed if the cycle is separated into three segments--the "rapid growth" stage, the "deceleration" stage, and the "turnaround" stage. ^{2/} The

^{2/} "Cattle Cycles and Economic Adjustments in the Beef Industry," Paul Hasbargen and Kenneth Egertson, paper contained in Cattle Feeders Days Report, University of Minnesota, December 1974.

turnaround stage and the rapid growth stage basically represent two different segments of the expansion stage. The deceleration stage includes parts of both the expansion stage and the liquidation stage of the inventory cycle.

Table 2 shows the years in the past three cycles that fall into each of these stages.

The rapid growth stage is typified by favorable and rising cattle and beef prices. Returns to all segments of the cattle business in that stage are above average because cattle feeders are buying and selling on a cyclically rising market. Producers of feeder cattle are enjoying rising prices as cattle feeders bid their feeding profits into replacement cattle. In turn, beef cow-calf producers are expanding their herds and, thus, their potential production of

feeder calves 1 to 3 years hence. As beef cow-calf producers expand their herds, fewer cull cows are sold and more heifers are held back to enlarge the breeding herd. In addition, calf slaughter is reduced as cattle feeders outbid packers for veal calves. Thus, cattle and calf slaughter drops to about 30 percent of inventory, compared to a normal of 35 to 37 percent of the January 1 inventory of all cattle and calves. With this abnormally low rate of slaughter, prices are higher than should be expected given the inventory of cattle and calves on hand.

Figure 1 shows how actual slaughter levels fall below available or potential slaughter levels in years that are typical of the rapid growth stage of the cattle cycle (that is 1950-52, 1958-63, and 1970-73).

Table 2. Calendar years of recent rapid growth, deceleration, and turnaround stages

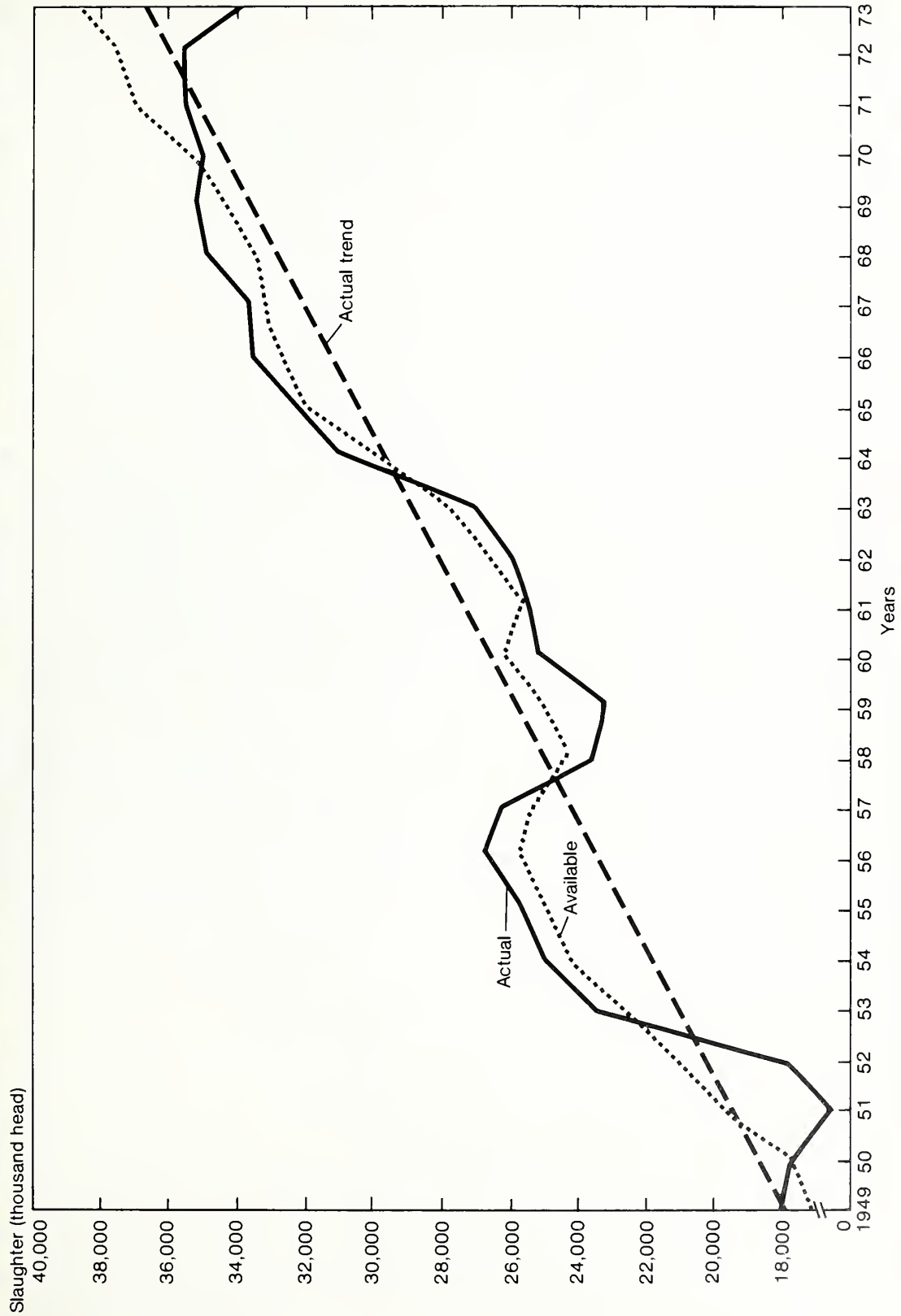
Cycle years	Stages		
	Rapid growth	Deceleration	Turnaround
1949-1957	1950-52	1953-56	1957-60
1958-1966	1961-63	1964-65	1966-70
1967-1981	1971-73 1974 ^{1/}	1975-78	1979-81

^{1/} The deceleration phase started in the last half of 1974. Therefore, 1974 was split into two stages - rapid growth and deceleration.

Source: "Cattle Cycles and Economic Adjustments In The Beef Industry," Paul Hasbargen and Kenneth Egertson, paper contained in Cattle Feeders Days Report, University of Minnesota, December 1974.

Figure 1

Relationship Between Actual and Available (Potential) Slaughter of All Cattle and Calves for the United States, 1949-1973



Source: The Beef Cycle of the 1970's, Keith Kendall and Wayne Purcell, Agricultural Experiment Station Bulletin B-721, Oklahoma State University, March 1976.

Eventually, increased marketings are generated from the expanded cow herd even though large numbers of heifers, calves, and cows are still being held back for continued expansion. After 5 or 6 years, increased marketings become large enough to weaken prices. Sharply lower cattle prices often occur because of any number of events, such as increasing supplies of competing meats or weakening business conditions, that could cause a drop in beef demand in face of the burdensome per capita supplies. Retail beef prices are forced down in order that all of the beef that is produced can be sold. Slaughter cattle prices drop. Cattle feeders suffer losses and the lower slaughter prices are reflected in sharply lower bids for the next group of feeder cattle purchased. The number of cattle on farms continues to rise another year or two after price break because the decisions to increase numbers were made when prices were higher. And, producers initially delay marketings because they are hesitant to sell at the sharply lower prices.

As a result, cattle numbers usually reach their peak in the cycle about 2 years after prices have peaked. Therefore, the largest cattle marketings occur sometime after prices have fallen.

In any event, these lower prices and resulting losses mark the beginning of the deceleration stage in the cattle cycle. Beef cow-calf producers respond to lower prices by reducing the size of their breeding herds, thereby cutting back on the production of feeder cattle and minimizing their losses. Culling of the cow herd is increased and fewer replacement heifers are held back. Thus more heifers are available for feedlot placement and an already large supply of feeder cattle becomes larger. Calf and "nonfed" steer and heifer slaughter also increase as packers are able to outbid feedlots for lower quality feeders. Total cattle and calf slaughter as a percentage of the January 1 inventory increases; and, as shown in figure 1, actual slaughter exceeds available or potential slaughter based on the average relationship between slaughter and the number of cattle and calves on hand. The magnitude of the price change is large during these supply cycles because the demand for meat is relatively insensitive to price in the short run. Thus, prices drop sharply; and returns to beef producers, especially cow-calf producers, drop below feed and cash costs of production. Table 3 shows that feed costs exceeded returns to cow herds in most of the deceleration years.

Table 3. Returns over feed costs to cattle feeders and beef cow-calf operators during various stages of the cattle cycle, 1950-80

Period	Cattle feeders		Cow calf operators	
	Return over feed cost per cwt. of gain ^{a/}	Sales per \$100 of feed	Return over feed cost ^{a/} per cow	Sales per \$100 of feed
<u>Rapid growth phase</u>				
		<u>Dollars</u>		
1950	17.09	170.00	151.00	169.00
1951	13.00	142.00	167.00	170.00
1952	-2.45	86.00	37.00	99.00
<u>Deceleration phase</u>				
1953	-6.50	81.00	-39.00	64.00
1954	-5.18	126.00	1.00	95.00
1955	1.07	106.00	-8.00	94.00
1956	4.55	117.00	-7.00	103.00
<u>Rapid growth phase</u>				
1961	2.48	116.00	23.00	139.00
1962	6.18	148.00	28.00	149.00
1963	-6.09	88.00	20.00	117.00
<u>Deceleration phase</u>				
1964	1.38	112.00	12.00	107.00
1965	7.12	151.00	11.00	127.00
<u>Rapid growth phase</u>				
1971	12.65	156.00	48.00	180.00
1972	12.26	161.00	106.00	208.00
1973	7.54	120.00	106.00 ^{c/}	184.00
<u>Deceleration phase</u>				
1974	-21.16	64.00	-139.00	41.00
1975	8.77	134.00	-78.00	95.00
1976	-7.43	193.00	-46.00	91.00
1977	8.99	116.00	19.00	107.00
<u>Turnaround phase</u>				
1978	28.88	170.00	242.00	199.00
1979	17.49	149.00	148.00	183.00
1980	3.72	111.00	155.00	169.00

^{a/} Annual Reports of Southwest Minnesota Farm Management Associations, Department of Agricultural Economics, University of Minnesota

^{b/} Annual Summaries of Illinois Farm Business Record Associations, Department of Agricultural Economics, University of Illinois

^{c/} Sales and feed costs were both higher but return over feed was the same as in 1972

As the size of the breeding herd is reduced, beef production starts to decline and prices begin to rise. This starts the turnaround stage. During this period, both cattle feeders and beef cow-calf operators start receiving positive returns. If the herd cutback is sharp, as it was in the 1950's and the 1970's, the bounce back in feeder prices will be large, resulting in excellent returns to cow herds during the turnaround stage. Note the high returns in table 3 in 1978 and 1979. However, after one very good year, cattle feeders are apt to realize only marginal returns for several years because feedlot capacity will be large in relation to feeder cattle supplies. Thus, the low returns to cattle feeders during 1980 and 1981 were expected, based on similar results following the sharp cutback in feeder cattle production in the late 1950's.

Improved profits result in a large drop in cow cull rates, an increase the size of the herd, and an increase in beef production. However, in the past, the population and per capita incomes have increased more rapidly than beef production during the turnaround stage. Consequently, retail prices and slaughter cattle prices increased. Individual cattle feeders then bid up the price of feeder calves as their returns increase and they begin to expand their feeding activities. This happened in 1978 and 1979. The cow-calf operators are then encouraged to start increasing their herds--either slowly or rapidly--depending on how much feeder prices have increased.

The relationship between returns to cattle feeders and

returns to cow-calf operators in various stages of the cattle cycle is shown in table 3. The very good returns to cow-calf operators during the rapid growth stages of the 1950's and 1970's led to high rates of cow herd buildup, which resulted in severe price "busts" in 1953 and 1974.

Such large variations in returns to beef enterprises help to explain much of the difficulty in attaining a "controlled" pattern of growth in cattle numbers. As individual cow-calf operators expand their herds, they fail to appreciate the impact that their collective actions will have on beef production 2 to 4 years later. If the rate of the cattle number buildup could be moderated, the size of the price break preceding the numbers peak could also be reduced. Note, for example, that the relatively low returns to cow herds during the early 1960's moderated the rate of growth during that period and, therefore, prevented the severe price-profit downturn that followed the more rapid expansion rates during the 1950's and 1970's.

The fact that the cycle tends to feed on itself creates a "whiplash" effect. That is, once prices start to trend upward or downward, producers' responses to these price trends only aggravate the existing beef supply situation. For example, more heifers are withheld and fewer cows slaughtered when prices are rising, while fewer heifers are with-held and herds are severely culled when prices are falling. These actions further magnify the amplitude of the cycle in beef supplies and prices.

Characteristics of the Current Cattle Cycle (1979 --)

A brief review of the particular characteristics of the cycles since 1958 may help illustrate the nature of the cattle cycle. Cattle prices declined after the Korean Conflict because of a 21 percent buildup in numbers from 1950 through 1953. Growth in numbers, however, did not stop until 1956, after several years of drought and a year of extremely low prices when the hog cycle and cattle cycle both peaked in 1955.

The turnaround year was 1958. Net returns were very high for cow-calf operations, causing rapid herd growth which could be accommodated by improved pasture conditions. Increased economic activity and plentiful grain supplies contributed to bringing favorable returns to both cattle feeders and cow-calf operators. Cattle numbers increased 10 percent from 1961 to 1964. Cattle prices finally declined in 1964 and 1965 because of an abundance of overfinished cattle on the slaughter market in the spring of 1964 and poor pasture conditions in 1963 and 1964.

Feeder prices recovered relatively quickly (after only 2 years rather than 3 or 4 years) because of (1) the huge supplies of low-priced grain which supported the feedlot segment, (2) feedlot expansion and technical advances in cattle feeding, (3) the strong economic activity in the late 1960's and strong consumer demand for beef, and (4) the additional acreage available for grazing that was released from the conservation reserve. Thus, growth in cattle

numbers was delayed only briefly, and this cycle was the only one in seven in which a significant decline in cattle numbers was avoided. This happened partly because the expansion rate had been more moderate during the rapid growth stage.

Growth in cattle numbers was relatively slow until 1970, when favorable prices caused cow-calf producers to expand at a more rapid rate. Growth rates were relatively rapid in the 1970-74 period, stimulated by the highest real returns to cow herds since the early 1950's. The increasingly larger beef supplies led to the price and income problems of the mid-1970's. And, the environment surrounding the industry was complicated by many factors in the 1973-75 period, causing price problems to be even more severe than normal. Some of the factors were consumer resistance movements; wage and price controls, including price ceilings on beef; a truck strike; a period of rapid economic inflation followed by a severe recession; an excess of over-weight cattle in 1974, and, finally, a drought which reduced pasture and forage production causing large increases in calf, cow, and nonfed steer and heifer slaughter. More importantly, the reduced feed grain output in 1974 occurred when grain stocks were short and feed grain prices advanced to new highs at a time when slaughter prices were falling. This combination of factors led to record large feedlot losses in the 1973-74 period and a subsequent dramatic turnaround in feeder cattle prices which pushed the cycle into the deceleration phase.

Thus, while supply-demand conditions in the late 1960's and early 1970's warranted some expansion in beef production, overexpansion combined with a change in many other factors caused a dramatic turn of events by 1974 and 1975. This led to the largest sustained losses ever suffered by the cow-calf sector of the industry from 1974 to 1977. It was not that cattle producers were totally ignorant or indifferent as to the consequences of their actions during the early 1970's. Rather, the slow, long-term biological process of the cattle industry once again provided a time lag in which many of the original supply-demand conditions changed sharply before intended marketings were realized. The drought and low prices caused marketings to exceed earlier expectations, resulting in negative returns to cow herds for 4 long years.

A sharp increase in beef prices came in 1978 as consumers bid aggressively on a red meat supply that was 7 pounds per person less than in 1977. Six pounds of the drop was in beef. Consequently, both cattle feeders and feeder cattle producers enjoyed excellent returns. (See table 3.) This encouraged a large cutback in cow slaughter during 1979 and 1980

and more heifers were again held back to start rebuilding cow herds. (In 1979, only 5.9 million cows were slaughtered compared with 9.9 million in 1977.)

As cattle numbers increased during 1980, beef supplies per person reached a low point for this cycle. The larger calf crop of 1980 and the larger cow herd in 1981 insured an increase in beef supplies during the early 1980's despite the 1981 cost-price squeeze on beef producers. The squeeze resulted in part from a stagnant demand for beef caused by low economic growth and abundant supplies of competing meats. Significantly higher feed costs following the drought-reduced 1980 crop and higher interest costs were the other major factors contributing to beef industry losses in 1981. Despite these losses, the cow herd is likely to increase until 1984 or 1985. If the increase is too rapid, another major "bust" will then occur. If it is more moderate, the mid-decade adjustment in cattle numbers and prices will be more like that of the 1960's. The next section provides a number of indicators that can be used to prejudge both the timing and the magnitude of the next price "bust."

MEASURABLE CATTLE CYCLE INDICATORS

The previous section described the common characteristics of cattle cycles and outlined the major forces affecting the past two cycles. But no two beef cattle cycles are identical. Therefore, this section provides some numerical clues that will help the interested cattle producer track the progress of future cycles. These clues, or indicators, can be very helpful in making decisions on individual herd expansion or contraction, changing the type of beef production-marketing system, or forward pricing.

Seven such indicators will be discussed in this section. Specific decision strategies aimed at capitalizing on what is learned from these indicators will be discussed in the next section.

The seven indicators discussed below should be watched for clues to forthcoming significant changes in the cattle cycle. While no single indicator can warn when cattle numbers will become excessive, the seven taken together will give a good idea of when price trouble and herd liquidation will start. On the other hand, they will also indicate when price strength and herd buildup will come. By closely monitoring these indicators and taking the actions suggested in the next section, cattle producers will minimize their losses in unfavorable price periods and maximize their returns in times of favorable cost-price relationships.

The basic data used to compute the seven indicators since 1950 are given in table 4. In table 5, all seven indicators are shown for the past three cycles.

The first important indicator is simply the year of the current cycle. Indicators 2 and 3 pertain to annual percentage rates of change in cattle numbers, while the other four compare selected slaughter rates to supplies available for slaughter each year.

The seven indicators are as follows:

- 1 - Year of the Cattle Cycle
- 2 - Percentage of Annual Expansion in All Cattle Numbers
- 3 - Percentage of Annual Expansion in All Cow Numbers
- 4 - Ratio of Annual Cattle and Calf Slaughter to January 1 Inventory
- 5 - Ratio of Annual Cattle and Calf Slaughter to Previous Year's Calf Crop
- 6 - Ratio of Annual Cow Slaughter to January 1 Inventory of All Cows
- 7 - Ratio of Cow and Heifer Slaughter to Steer Slaughter

In table 5, the shaded figures represent warning indicators. That is, an excessive buildup is under way. Note that when most indicators show trouble ahead, cattle prices are either high or became high a year earlier. When most indicators are outside the shaded area, cattle prices are low and starting to rise.

Table 4. Cattle inventories and annual cattle slaughter, United States, 1950-81

Year	January 1 Inventory			Total		Commercial slaughter			
				cattle					
	All cows and milk heifers that have calved 1/			and calf slaughter: including: calf farm slaughter:					
	cattle	500+	crop	crop	slaughter:	cattle	Steers	Heifers	Cows
	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)
1950	77,963	37,739		34,899	29,115	17,901	9,488	1,898	5,836
1951	82,083	39,255		35,825	25,986	16,376	8,516	1,654	5,519
1952	88,072	41,098		38,273	28,013	17,856	9,732	1,911	5,553
1953	94,241	44,016		41,261	36,665	23,606	12,652	2,738	7,483
1954	95,679	46,132		42,601	39,159	25,017	12,584	3,352	8,456
1955	96,592	46,341		42,112	39,451	25,723	12,552	3,601	8,977
1956	95,900	45,549		41,376	40,754	26,862	13,726	3,788	8,811
1957	92,860	44,177		39,905	39,421	26,232	13,509	4,013	8,158
1958	91,176	42,801		38,860	34,106	23,555	13,144	3,934	6,077
1959	93,322	42,653		39,938	31,795	22,931	12,704	4,861	5,045
1960	96,236	43,308		39,416	34,644	25,224	13,722	5,373	5,776
1961	97,700	44,062		40,180	34,554	26,635	14,330	5,794	5,178
1962	100,369	45,141		41,441	34,771	26,083	14,685	5,660	5,451
1963	104,488	46,475		42,268	35,278	27,232	15,713	6,046	5,228
1964	107,903	47,966		43,809	39,314	30,818	17,659	6,287	6,503
1965	109,000	48,780	10,480	43,922	40,963	32,347	16,400	7,375	8,087
1966	108,862	47,990	10,210	43,537	41,039	33,727	17,100	8,567	7,555
1967	108,783	47,495	10,115	43,803	40,410	33,869	17,883	8,738	6,774
1968	109,371	47,685	10,190	44,315	41,037	35,026	18,178	9,457	6,830
1969	110,015	48,040	10,140	45,177	40,586	35,237	18,182	9,549	6,906
1970	112,369	48,780	10,311	45,871	39,559	35,087	18,926	9,456	6,125
1971	114,578	49,786	10,507	46,738	39,730	35,651	19,292	9,335	6,386
1972	117,862	50,585	10,815	47,682	39,335	35,842	19,721	9,472	6,004
1973	121,539	52,553	11,306	49,194	36,506	33,687	18,325	8,439	6,246
1974	127,788	54,478	12,133	50,873	40,528	36,812	19,682	8,795	7,515
1975	132,028	56,931	12,970	50,183	46,870	40,911	17,818	10,438	11,557
1976	127,980	54,974	11,153	47,384	48,726	42,654	18,879	12,158	10,619
1977	122,810	52,424	10,416	45,931	48,073	41,856	19,341	11,748	9,864
1978	116,375	49,748	9,740	43,818	44,272	39,552	18,526	11,756	8,470
1979	110,864	47,843	9,454	42,603	36,932	33,678	17,378	9,733	5,927
1980	111,192	47,865	10,097	44,998	36,796	33,807	17,140	9,601	6,322
1981	114,321	49,586	10,481	44,714	38,953	34,953	17,504	10,028	6,445

^{1/} Cows and heifers 2 years old or older for the period 1950 to 1964 were adjusted to cows and heifers that have calved using the published data for the series for the 1965-70 period. The adjustment factor: Cows and heifers that have calved = $-4.15905 + .98811$ (cows and heifers 2 years) + $.03569$ (year).

Source: Statistical Reporting Service, U.S. Dept. of Agriculture.

Table 5. Cattle cycle indicators

Inventory indicators										Slaughter rate indicators											
Year	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
of	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth	annual growth
cycle	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total	rate--total
Year(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1950	2																				
1951	3	+5	+4	37	74	15	82	23.30	26.30												
1952	4	+7	+5	32	78	14	84	28.70	32.00												
1953	5	+7	+7	39	96	17	81	24.30	25.80												
1954	6	+2	+5	41	95	18	94	16.30	16.80												
1955	7	+1	0	41	93	19	100	15.60	16.80												
1956	8	-1	-2	42	97	19	92	14.90	16.10												
1957	9	-3	-3	42	95	18	90	17.20	18.70												
1958	1	-2	-3	37	85	14	76	21.90	25.30												
1959	2	+2	0	34	82	12	78	22.60	26.70												
1960	3	+3	+2	36	89	13	81	20.40	22.90												
1961	4	+2	+2	35	88	12	77	20.20	23.70												
1962	5	+3	+2	35	87	12	76	21.30	25.10												
1963	6	+4	+3	34	85	11	72	19.90	24.00												
1964	7	+3	+3	36	93	14	72	18.00	20.40												
1965	8	+1	+2	38	94	17	94	19.90	22.10												
1966	9	0	-2	38	93	16	94	22.20	26.00												
1967	1	0	-1	37	93	14	87	22.30	26.30												
1968	2	+1	0	38	94	14	90	23.40	27.60												
1969	3	+1	+1	37	92	14	91	26.20	31.50												
1970	4	+2	+2	35	88	13	82	27.10	34.50												
1971	5	+2	+2	35	87	13	81	29.00	36.40												
1972	6	+3	+2	33	84	12	78	33.50	44.70												
1973	7	+3	+4	30	76	12	80	42.80	56.60												
1974	8	+5	+4	32	82	14	83	35.60	35.20												

Table 5. Cattle cycle indicators--Continued

Inventory indicators										Slaughter rate indicators									
Year	:	Percent	:	Percent	:	Percent	:	Slaughter	:	Cow slaughter	:	Cow & heifer slaughter	:	Prices received					
of	:	annual growth	:	annual growth	:	of Jan. 1	:	as percent	:	as percent	:	as percent of	:	by farmers					
cycle	:	rate--total	:	rate--cow	:	inventory	:	prev. year's	:	of	:	steer slaughter	:						
:	:	inventory	:	herd	:	slaughtered	:	calf crop	:	cow herd	:		:						
Year(1)	:	(2)	:	(3)	:	(4)	:	(5)	:	(6)	:	(7)	:	Cattle : Calves	:	:	:		
1975	9	-3		-5		36		92		20		123		32.30	27.20				
1976	10	-3		-3		38		97		19		121		33.70	34.20				
1977	11	-4		-5		39		101		19		112		34.40	36.90				
1978	12	-5		-5		38		96		17		109		48.50	59.10				
1979	1	-5		-4		33		84		12		80		66.00	88.80				
1980	2	0		0		33		86		13		93		62.40	76.80				
1981	3	-3		-4		33		84		13		91							
Warning indicators (see screened data):																			

Warning indicators (see screened data):

- (1) Fifth to seventh year of cycle
 (2) Growth rate above 2% for several years
 (3) Growth rate above 2% for several years
 (4) Less than 37% of inventory slaughter
- (5) Slaughter less than 88%
 (6) Less than 13% of cow herd slaughter (Less than 15%, 1950's; less than 14%, 1960's and early 1970's.)
 (7) Female slaughter less than 85% prior to 1970; 90% from 1970 forward

A brief discussion of each of the seven indicators follows:

Year of the Cattle Cycle

The first indicator is simply the number of years from the low point in one cycle to the low point of the next cycle. Of the past five cycles, two were 9 years long, one was 10 years, one was 11, and the last one, just completed on January 1, 1979, was 12 years long. Cattle numbers in every cycle in the 20th century have taken from 6 to 8 years to go from the low point to the high point (figure 2). Because cattle prices break 1 to 2 years before cattle numbers decline, the large price break can be expected during the fifth to the seventh years of expansion. Therefore, these years are shaded in table 5.

The first year of the current cattle cycle was 1979. No significant price break should be anticipated before 1983. This caution light will be flashing during the 1983-85 period. If most of the other indicators are also flashing at that time, defensive actions should be taken.

Percentage of Annual Expansion in all Cattle Numbers

In the past, whenever the growth rate in number of cattle has exceeded 2 percent per year for 2 or 3 years in succession, beef supply and price problems have been imminent. Historically, beef demand has increased about 2 percent per year as a result of increased per capita incomes and population growth. Therefore,

excessive supply and price problems followed several successive years with growth rates greater than 2 percent per year.

Whenever the growth rate was consistently below 2 percent per year, better prices were usually ahead. In the future, demand may grow at only 1.0 percent to 1.5 percent per year because both population and per capita income growth rates are expected to be lower than in the past. In fact, real income in 1980 was 0.4 percent less than in 1979.

Percentage of Annual Expansion in All Cow Numbers

Whenever the cow herd growth has sustained more than a 2 percent increase each year for several years, numbers have increased faster than demand and the industry has overproduced. The 1975 price depression was preceded by 6 years of cow herd growth rates of between 2 and 5 percent per year. Since 1975, cow herds have declined and prices have recovered.

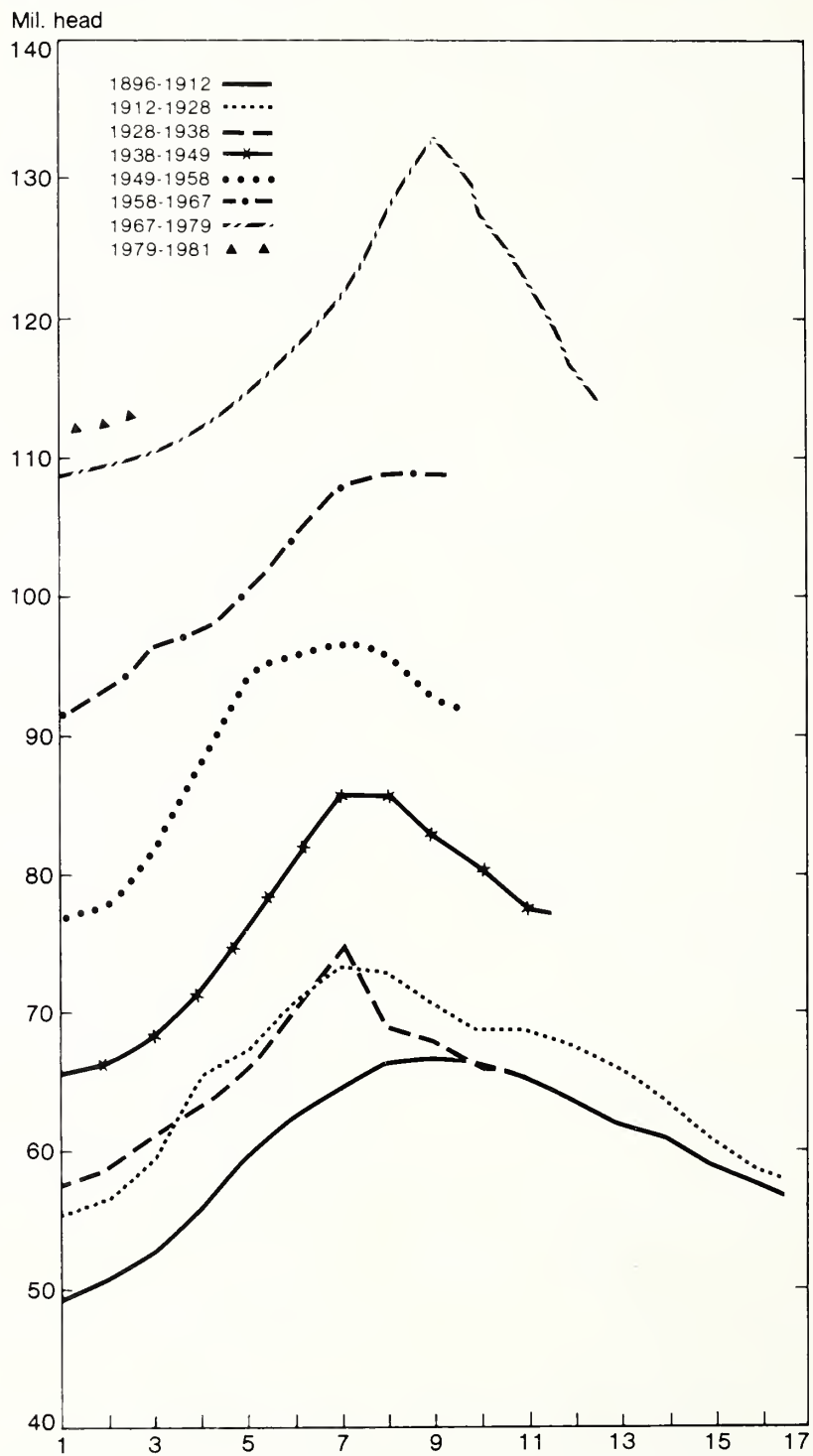
Future cow herd growth will need to average only 1.0 percent to 1.5 percent per year to keep up with expected growth in demand. But because of the sharp cutback in recent years, a growth rate of over 2 percent can probably be sustained over several years before a sharp price break occurs.

Ratio of Annual Cattle and Calf Slaughter to January 1 Inventory

When the ratio of cattle and calf slaughter to the January 1 inventory is less than 37 percent, the cattle herd is increasing too

Figure 2

Cattle Inventory Cycles, 1896-1981



fast. In each of the past two cycles, the price break came after slaughter remained below 37 percent of inventories for 5 years in succession.

For a future cattle herd growth of from 1.0 percent to 1.5 percent per year necessary to keep pace with demand, the industry should kill about 37 percent of the inventory each year.

Ratio of Annual Cattle and Calf
Slaughter to the Previous Year's
Calf Crop

A ratio of annual cattle and calf slaughter to the previous year's calf crop of less than 88 percent warns that the cattle herd is building too fast, and a ratio greater than 88 percent indicates producers are liquidating their herds.

In past cycles, when a year's slaughter was less than 88 percent of the previous year's calf crop for 2 or 3 years, such as between 1971 and 1973, price trouble was ahead. The low slaughter in relation to the estimated calf crop during the past 3 years indicates a rapid rebuilding of cattle numbers.

Ratio of Annual Cow Slaughter
to January 1 Inventory of all Cows

The danger level of this indicator has been moving lower as the cow herd mix has been changing to more and more beef animals. With the greater proportion of dairy cows in the 1950's, an overall slaughter rate of 14 percent to 15 percent was too low. In the past two cycles, cow

slaughter at less than 14 percent of the cow herd indicated expansion, and less than 13 percent indicated overexpansion. A return to slaughter rates of less than 13 percent will signal price problems ahead.

Ratio of Cow and Heifer Slaughter
to Steer Slaughter

Because of the increase in heifer feeding during the past two decades, the danger level of this indicator has been moving upward. In the past, when female slaughter was less than 85 percent of steer slaughter (such as the 78 percent rate in 1972), the cow herd was building too fast. With current high levels of heifer feeding, the danger level of this measure is now about 90 percent. A ratio of 90 percent or less indicates that too many heifers are being held back for herd expansion.

In the past, the warning signals shown in table 5 provided excellent clues as to future price problems and opportunities. For example, in 1972, six of the seven signals were flashing caution. In 1973, all seven were flashing bright red, clearly signaling a large price bust at a time when most people in the beef industry were still "bullish" on beef prices. This gave the prudent producer, who was watching signals such as these, an excellent opportunity to cash in on the top beef prices prevailing until late 1973 and to prepare for the crash that followed. Similar opportunities were presented by these early warning signals in the previous two cycles.

The first two sections of this report established (1) that there are persistent cycles in cattle numbers and prices and (2) that the cattle inventory numbers reported by USDA have historically contained some good clues as to when beef price downturns are imminent. The purpose of this section is to build on the preceding information and develop some production-marketing strategies that a cattle producer can use to increase net earnings from the beef enterprise throughout a beef cattle cycle. We will deal primarily with the concerns of cow-calf operators or feeder cattle producers. They take the brunt of the beef price downturn after each overexpansion in cattle numbers. They are also the ones who, through their collective expansion-contraction decisions, generate the beef cattle cycle.

First, we will examine how the profit patterns of different types of production enterprises change with different stages of the cattle cycle. Then we will explore several alternative production-marketing strategies that will take maximum advantage of the regularly occurring profit-loss cycles.

Profit and Cattle Cycles

Profits depend on production costs and cattle prices. Every producer has a slightly different set of production costs. Costs

also change through time with changes in production practices and inflation. The production costs used in calculating the returns shown in table 6 were based on beef records kept by farmers in northern Minnesota during the late 1970's. These costs were adjusted for changes in input prices during the past 30 years and are expressed in 1978 dollars. ^{3/} Feeder calf prices for each year were also adjusted to a 1978 purchasing-power dollar (see table 6) as were cow prices. However, no attempt was made to adjust for any increase in production efficiency that may have occurred during the 30-year period shown. This lack of adjustment for gains in productivity may partially explain the lower average net returns shown in the table for beef enterprises during the last cycle in contrast to the two previous cycles. (For example, increased weaning weights and the higher percentage of calf crops during the 30-year period would partially offset the lower average price received for animals sold and increase the returns shown in the 1970's relative to those in the 1950's.)

^{3/} Feed costs were adjusted according to variations in hay and grain prices; interest costs were adjusted according to interest rates charged by production credit associations; other nonfeed costs were adjusted with the USDA's prices-paid-by-farmers index.

Table 6. Feeder production enterprise returns to land, labor, and facilities, northern Cornbelt, 1949-78

Year	Profits				
	Calf price 1/	Cow-calf 2/	Overwinter steer calf 3/	Pasture steer 4/	Overwinter steer calf and pasture steer combined
	Dollars per cwt.		Dollars per head		
1949	72.00	46.30	41.40	61.43	102.83
1950	93.50	121.71	81.58	164.79	246.37
1951	110.19	198.62	81.39	162.22	243.61
1952	73.78	72.10	-18.33	-0.11	-18.44
1953	54.07	11.74	-54.35	28.62	-25.73
1954	52.40	2.37	31.03	73.82	104.85
1955	55.02	9.06	35.31	62.01	97.32
1956	54.21	7.92	0.11	83.50	83.61
1957	66.74	67.63	49.18	99.71	148.89
1958	86.33	126.25	95.15	76.31	171.46
1959	80.10	73.62	16.27	29.41	45.68
1960	68.64	50.92	0.04	17.66	17.70
1961	70.73	63.88	2.53	80.34	82.87
1962	74.58	83.50	16.09	87.68	103.77
1963	69.79	69.04	-21.24	56.79	35.55
1964	55.49	-5.19	-75.49	50.75	-24.74
1965	59.97	21.72	6.35	95.65	102.00
1966	65.03	54.98	35.04	54.37	89.41
1967	63.16	40.18	-7.94	62.80	54.86
1968	64.23	45.84	4.22	64.10	68.32
1969	71.65	71.04	60.75	29.25	90.00
1970	71.08	74.41	30.12	16.09	46.21
1971	69.35	83.68	14.53	61.06	75.59
1972	86.93	128.49	34.53	118.22	152.75
1973	92.34	124.79	36.77	78.17	114.94
1974	41.50	-81.63	-176.02	5.93	-170.09
1975	40.15	-71.92	-40.08	87.26	47.18
1976	40.09	-119.38	-20.74	8.71	-12.03
1977	46.53	-28.73	12.99	32.29	45.28
1978	70.97	71.61	83.00	86.00	169.00

1/ Choice steer calf prices in 1978 dollars.

2/ Returns over feed and cash costs per beef cow in 1978 dollars.

3/ Returns over feed and cash costs per steer overwintered at 1 pound per day gain from October to May in 1978 dollars.

4/ Returns to land and labor per steer pastured at 1.2 pounds per day gain from May to October in 1978 dollars.

Source: Production/Marketing Alternatives For northern Minnesota Cow-Calf Producers, Robert H. Craven and Paul R. Hasbargen, (M.S. Plan B Project Paper, Department of Agricultural and Applied Economics, University of Minnesota, April 1981.)

Table 7 shows the results of a similar analysis of three hypothetical production enterprises in Oklahoma during the last three cattle cycles. However, overhead costs, including labor, are considered in this analysis. The net returns or profits are expressed on the basis of 100 pounds of feeder animal sold and are determined by subtracting all production costs from the feeder prices prevailing at the time of sale. For example, the market price of calves in the fall of 1949 was \$23.17 while the production cost per hundredweight of calf produced for sale was \$19.61, leaving a calculated profit of \$3.56 per hundredweight sold. Replacement heifers were subtracted from total production, leaving 350 pounds of calf production per cow. Cow sales were subtracted from production costs before allocating those costs to this 3.5 hundredweight of production.

Note that these net returns are not adjusted for purchasing power as are the per head returns in table 6. Remember this difference when comparing the two sets of figures or in using either set.

The simulated returns to the hypothetical example of beef operations shown in tables 6 and 7 do not vary as much as the returns shown in annual farm management summaries because the inventory values of all beef animals are held constant during the year. By contrast, farm management yearend enterprise statements usually value market animals at current market prices. This accounting procedure gives results that show greater year-to-year changes in returns

during the course of the cattle cycle than those shown in table 6.

Returns to Cow-Calf Operations

Per cow returns shown in table 6 are returns above the costs of winter feed, interest, and \$35 in cash expenses per cow in 1978 dollars. No charge was made for pasture, facility depreciation, or labor and management. Thus, the figures represent a before-tax return to pasture land, labor and facilities. Sales income was based on an 85 percent calf crop and an average weaning weight of 425 pounds for steer calves and 400 pounds for heifer calves. The cow-calf enterprise in table 7 assumes costs of \$50 per cow for winter feed costs, \$40 in interest, \$31 per cow in operating costs, \$75 per cow in land and pasture costs, \$35 per cow in labor costs, and \$30 per cow in overhead facility costs. These costs are in 1978 dollars. A \$35-per-year sales credit for cull cow (1979 dollars) is subtracted from these costs, leaving \$226 to be covered by the sale of a 350-pound calf. This would require a selling price of \$64.57. Actual calf prices in the fall of 1978 were about \$5 higher than this calculated break-even price, leaving a positive profit to the cow-calf enterprise in that year. All costs are adjusted by appropriate prices and indexes to reflect price changes in other years.

The purpose of the return estimates in tables 6 and 7 is not to show absolute average profit figures for the industry but, rather, to determine the pattern of returns through a beef cycle. The research results in Oklahoma and

Table 7. Feeder production enterprise profits, Southern United States, 1949-80

Year	Profits			
	Calf	Cow-calf 2/	Winter	Summer
	prices 1/		stockers 3/	stockers 4/
	Dollars/cwt		Dollars per hundred weight	
1949	23.17	+ 3.56	+ 4.34	- 0.68
1950	31.48	+ 12.02	+ 4.36	+ 6.05
1951	36.30	+ 14.85	+ 7.52	- 0.83
1952	26.07	+ 3.12	+ 0.22	- 5.50
1953	17.09	- 5.31	- 4.66	- 3.10
1954	19.78	- 2.48	+ 2.08	+ 1.20
1955	19.48	- 1.81	+ 0.89	- 0.99
1956	18.78	- 3.11	- 1.47	+ 0.88
1957	24.30	+ 1.90	+ 1.36	+ 3.13
1958	32.21	+ 9.43	+ 4.32	+ 2.26
1959	29.01	+ 6.17	+ 1.37	- 1.18
1960	25.18	+ 1.31	- 0.55	- 1.82
1961	26.60	+ 3.11	+ 0.78	+ 0.71
1962	28.49	+ 4.73	+ 0.26	+ 1.62
1963	25.90	+ 1.47	- 1.71	- 0.69
1964	21.41	- 3.45	- 4.17	- 0.58
1965	25.03	- 0.55	+ 0.24	+ 3.09
1966	27.17	+ 0.06	+ 2.14	- 0.41
1967	27.13	- 0.99	- 1.60	+ 0.30
1968	28.14	- 0.82	+ 0.01	- 0.25
1969	32.02	+ 1.40	+ 2.99	+ 0.13
1970	34.45	+ 0.99	+ 2.02	- 1.19
1971	38.78	+ 6.35	+ 0.01	+ 2.89
1972	46.44	+ 12.61	+ 1.33	+ 6.31
1973	57.57	+ 14.66	+ 8.53	+ 2.55
1974	27.86	- 24.17	-13.68	-13.35
1975	32.33	- 21.16	- 4.37	+ 5.28
1976	36.00	- 20.84	+ 2.49	- 7.55
1977	41.66	- 18.02	- 2.66	- 2.81
1978	69.54	+ 5.03	+ 7.16	+ 5.94
1979	97.23	+ 17.18	+19.82	+ 8.27
1980	75.02	- 12.34	-15.95	- 8.86

1/ Actual September-November prices for appropriate mix of steer and heifer calves.

2/ Profits per cwt. of calf sold, assuming sales of 350 pounds per cow.

3/ Purchased at 425 pounds previous September-November, sold at 675 pounds at March-May price.

4/ Purchased at 450 pounds at March-May price, sold at 675 pounds at September-November price.

Source: Integrated Risk Management for Beef Cattle Producers, John Ikerd, Oklahoma State University, Agricultural Economics paper given at the Extension-Industry Long Run Beef Outlook Seminar, Kansas City, April 1979.

Minnesota show the same pattern of returns. The year of 1949 was the fifth year of an increasing cattle price trend that began in 1945. In the early 1950's, large numbers of replacement heifers were withheld from the market to fuel the most rapid annual growth rate ever recorded in the national cow herd in 1952 and 1953 (see table 5). As heifers were retained, cow-calf returns reached record high levels. But then came the market crash of 1953 and 4 years of losses to cow-calf operations as female slaughter picked up. United States hog numbers peaked in the same year as cattle numbers (1955).

Following the cutback, in both cattle and hog numbers in 1956 and 1957, cow-calf returns bounced back to excellent levels in 1958 and 1959 as the new cattle cycle started. It was followed by 4 more relatively favorable years. But in the seventh year (1964) of the new cycle, cattle numbers had again been expanded too much and 5 years of losses, or near losses, followed. However, the smaller losses of 1964 and 1965, in contrast to those from 1953 through 1956, merely leveled off cattle numbers in the mid-1960's instead of bringing about a significant reduction as in the 1950's. Then, as profits gradually improved, the herd expansion rate also increased until the sharp price break came in 1974

Unfortunately, feed prices and other costs rose sharply in the mid-1970's at the same time that cattle numbers were at an alltime high. The combination of record low real calf prices (see table 6) and near record high real feed

prices led to the largest losses sustained by the cow-calf sector in modern times from 1974 through 1977.

This review reveals a fairly consistent profit cycle for the cow-calf enterprise: cattle numbers build to the level where retail prices must be significantly reduced in order to sell all the beef produced; feeder prices drop back sharply; negative returns cause herd reductions which, after several years, reduce numbers enough to bring a fairly sharp price and profit recovery. These profits generate the next numbers cycle.

Returns to Stocker Operations

Although the terms used in the last two columns of table 6 and 7 are different, they describe essentially the same operations. The wintering programs involve taking a freshly weaned steer calf in the fall of the year and carrying it through to the following spring. The northern pasturing program and the southern summer stocker program carry "short yearling" feeders through a summer grazing season. The assumed beginning and ending weights in the northern overwintering and pasturing programs are 425 to 637 pounds and 637 to 820 pounds, respectively. For the southern overwintering and pasturing programs, they are 425 to 675 pounds and 450 to 675 pounds.

The returns in table 6 again represent returns to labor, facilities, and pasture land per head kept, while the profits in table 7 are expressed in per hundredweight of feeder sales after

making allowances for costs of facilities, labor, and pasture.

The most striking detail in the pattern of returns for the winter program is the large losses that occur for 2 years during each price break point in the cycle (1952-53, 1963-64, 1974-75).

The other fairly consistent pattern is that returns to overwintering programs are more profitable during the expansion phase of the cattle cycle--up until the price downturn year--than during the year or two following the downturn year.

The pattern of returns from the summer grazing enterprise is similar but decidedly less marked. Returns were sharply reduced in the big price downturn periods of the 1950's and 1970's, but not in the mid-1960's. Also, note that the returns to the northern and southern programs have been decidedly less comparable. Part of this is caused by feeder price variations between areas and part by differences in the months the cattle are marketed and the price adjustments made for weights. Small differences in buying and selling prices can make significant differences in returns when the purchase weight represents the major proportion of the sale weight--that is, when relatively little weight gains are added by the feeding or grazing enterprise.

The Oklahoma analysis in table 7 has been extended through 1980. The years of 1978 and 1979 were quite typical of the early years of the rebuilding phase of a cattle cycle. However, significant losses were incurred in the cow-calf phase and both stocker

phases of the cattle business in 1980. These losses were brought about by record large supplies of pork and poultry and sluggish growth in per capita incomes, which reduced the demand for beef. Thus, cattle prices dropped to unprofitable levels in spite of cyclically small beef supplies. This is an example of a situation where factors external to the beef production and marketing system did not allow cattle prices to rise to profit levels typical of this phase of the beef production cycle. But the odds would still seem to favor a resumption of the generally profitable phase of the cycle through 1982 or 1983. However, at the end of 1981, four of the seven indicators were starting to flash warning signals.

Summary

There is a strong tendency for both cow-calf and stocker operations to be affected similarly by sharp breaks in the market, but after these breaks, cow-calf production remains unprofitable over a number of years until the next buildup in numbers begins. Stocker operations show more of a random distribution of profits and losses following the major breaks, but with a tendency, especially in the overwintering program, to be relatively more profitable than cow-calf production in the early expansion phase of the numbers cycle.

Profit Maximizing Management Strategies

The profit patterns of feeder production enterprises during the past three cattle cycles suggest

several management strategies that should be seriously considered by the profit-oriented feeder cattle producer. These include (1) flexibility in the type of feeder production program followed, (2) forward pricing during certain years of the cycle, (3) selling out or reducing herd size when danger signals are flashing and restocking later, and (4) extending ownership through a feedlot.

Flexible Production

Feeder producers have several alternative ways of using their resources. For example, the cow-calf operator can (1) sell calves in the fall, (2) overwinter them and sell in the spring, (3) retain them through the pasture season and sell as fall yearlings, or (4) reduce the size of the cow herd and, consequently, reduce the size of the total operation just prior to the unprofitable phase of the cycle and rebuild the herd to full capacity prior to the most profitable years.

Alternative number 4 would periodically entail reducing the size of one's basic breeding herd and then rebuilding it. One might argue that this is impractical. But changing cow numbers over the duration of a cycle indicates that cow herds are liquidated and rebuilt. Unfortunately, the liquidation is frequently a forced liquidation following 3 to 4 years of losses rather than a planned liquidation preceding the loss phase of the cycle. And, the rebuilding is frequently accomplished through purchase of high priced breeding stock just before a major price break rather than a planned rebuilding in

advance of a rising market. These typical changes result in even greater losses in bad times and lower profits in good times than would result if the herd were kept stable. But a counter-cyclical, expansion-contraction strategy would be the most profitable.

In addition to changing the size of the basic cow herd, shifts from cow-calf to cow-yearling programs--and back--can be made with comparative ease. A comparison of the returns to cow herds versus the returns to stocker operations will give some clues as to when the cow yearling operation is most likely to be superior to the cow-calf program.

The historical returns show that large profits could have been made by producers who were able to shift a large share of their resources from beef cows to stocker operations during the unprofitable phase of the beef cycle. Although all three enterprises lost money in each downturn year, the stocker operations generally became profitable during the subsequent 2 or 3 years while the cow-calf operation remained unprofitable. This is especially true if the "combined" stocker operation is followed--the calves are overwintered and then pastured.

A close examination of returns to each enterprise during the downturn years (1953, 1964, 1974) shows that feeder producers would have been better off if they had sold calves in each of those years instead of holding them and ending up with even larger losses. The cow-calf program also appears

to be superior in the years just preceding the downturn year. Thus, net returns could be enhanced by shifting from a cow-yearling program to a cow-calf program after cattle numbers have expanded for a few years and the rapid growth stage lights up more and more of the indicators discussed in section 2.

A summary of the data on returns, as shown in table 8, helps to support the preceding observations. Note that the cow-calf program definitely produces larger earnings during the high-risk rapid herd expansion years and shows lower losses per cow (or per hundredweight of sales) than the combined stocker programs during the price downturn years in both the northern and southern locations. By contrast, the stocker programs are definitely superior during the 2 years following the downturn year.

No average returns for the early expansion years are shown in table 8 because there is no consistent pattern of superiority of one program over the other. In fact, of the 9 years studied, 3 show higher returns to cows, 3 show higher returns to stockers, and returns for 3 years are questionable. However, there was an earlier and more pronounced shift in advantage to the cow-calf operation following the sharp cutback in cow numbers in the late 1950's. In the first and second years of the next cattle cycle (1958 and 1959) the cow herd program regained a marked profit advantage in contrast to the more prolonged advantage of cow-yearling programs (cow-calf

plus combined stocker programs) in the other two cycles. The same rapid comeback in cow-calf profits was expected in the early expansion phase of the current cattle cycle because of the very deep cutback in cow numbers during the late 1970's. A sharp rebound to near record real profits did occur in 1979, but the subsequent drop in demand for beef coupled with increased production costs resulted in negative returns to all sectors of the beef industry in 1980-81.

The analysis of the pattern of returns to different beef enterprises during the various stages of the cattle cycle (table 8) suggests that the typical feeder cattle producer can take actions that will enhance average ranch earnings through a beef cycle. The shift should be made from a cow-calf to a cow-yearling program the fall of the big price break year in each cattle cycle. This can be done by simply selling off about one-half of the cow herd (as early in the summer as feasible) and retaining all calves after the big break. The yearling program should be maintained for several years--at least until the major upturn year in feeder prices comes. (Additional feeder animals may be purchased some years if it is deemed desirable to cut the cow herd back so sharply that forage resources would not be fully utilized with one's own feeder animals.)

The major upturn in feeder prices should signal the cow yearling producer that it is time to move out of stocker programs,

increase the cow herd, and sell calves in the fall. (Cow purchases, before the rush for herd expansion starts, would be the quickest way to make the change. Alternatively, a couple of years of large heifer holdbacks would give the same result.) The upturn year for feeder prices usually occurs very early in the expansion phase (as it did in 1950, 1958, and 1969) or, if the cow cutback is severe as in the late 1970's, it can occur at the end of a prolonged liquidation phase (1978).

To test what a profit maximizing manager might have done during the past 30 years, a computer model based on the input-output data from northern Minnesota farms was developed. Year-to-year flexibility was limited by not allowing cow purchases nor changes in forage acres. The manager was given perfect foresight as to cattle prices and could sell calves in the fall or hold them over until the spring, summer, or fall of the next year. The profit maximizing

Table 8. Average returns by enterprise for selected stages of the past three cattle cycles 1/

<u>Cow-calf</u>		<u>Overwintering</u>		<u>Summer stockers</u>	
Northern	Southern	Northern	Southern	Northern	Southern
High-risk, rapid herd expansion years (1950-52, 1961-63, 1970-73) <u>2/</u>					
<u>Dollars/head</u>	<u>Dollars/cwt</u>	<u>Dollars/head</u>	<u>&cwt</u>	<u>&/head</u>	<u>\$/cwt.</u>
84.86	5.88	26.04	2.35	26.78	0.51
Downturn year (1953, 1964, 1974)					
-27.89	-10.98	-88.34	-7.50	-0.03	-5.68
Two years following the downturn year					
-19.45	- 7.80	14.83	+0.57	23.16	0.10

1/ Returns are averages of figures for selected years from tables 6 and 7.

2/ These years began with the fourth year of herd expansion and continue until the downturn year.

program determined under these constraints is outlined in table 9.

Note that, assuming perfect price forecasting ability, the operator would have cut back sharply on cow numbers, either just prior to the big price turndown or in the same year. With the smaller subsequent losses after the 1963-64 turndown, the cutback in cows was not as great as in the 1950's and 1970's.

Under the cost and resource situation used in the example, the yearling programs were almost always selected. Calves were sold in the fall only in the year or two before the big feeder price breaks. After the price breaks, all calves should be held over winter. It was more profitable to overwinter all calves on rations that would give gains of about 1.25 pounds per day, and to selling the heifers in the spring and the steers either in the spring or in October.

Forward Pricing

Most of the research and information related to futures markets and hedging deal with the short- to intermediate-run situation. That is, they deal with hedging a particular group of cattle that is in production or

will soon be in production. Futures markets have been realistic marketing alternatives for feeder cattle producers only since the late 1960's, and for stocker operations only since the 1970's. However, most research indicates that futures markets tend to underprice on a rising market and overprice on a falling market relative to later cash market prices. Thus, there would appear to be potential to at least minimize losses during the downturn of the cattle price cycle by following a systematic procedure of hedging.

One of the basic problems of a downturn hedging strategy when prices are declining is determining at what point the cycle is going to turn up again. Hedging too early, as the market approaches its peak, would result in reduced profits. Waiting too long to hedge would mean no protection from the large losses that occur on the initial price break. However, producers can handle this problem by paying close attention to medium range outlook information and the indicators discussed in section 2 as this critical point of the cycle approaches. For example, by mid-1973 all of the indicators in table 5 were flashing, warning that a major price break was imminent.

Table 9. Number of cows kept and timing of feeder sales under a profit maximizing strategy during the past three cattle cycles ^{1/}

Year ^{2/}	Cow	Steer calf	Heifer calf	Cull cow	Replacement heifer	Winter heifer	Winter steer	Summer through Oct steer
1948-49	77.00	--	--	15.47	10.37	21.98	18.40	13.94
1949-50	59.98	--	--	--	11.20	13.98	25.24	--
1950-51	69.16	--	--	4.28	3.29	25.79	29.10	--
1951-52	74.69	--	27.90	54.56	3.79	--	31.43	--
1952-53	21.93	9.32	--	--	9.18	--	--	--
1953-54	25.29	--	--	--	10.59	--	--	10.59
1954-55	33.96	--	--	--	14.22	--	--	14.22
1955-56	43.87	--	--	--	9.89	8.52	--	18.37
1956-57	57.21	--	--	--	10.45	13.71	18.92	5.31
1957-58	65.96	--	--	5.42	10.46	17.25	27.76	--
1958-59	69.68	--	--	9.04	10.42	18.85	29.32	--
1959-60	69.71	--	--	9.27	10.76	18.52	29.33	--
1960-61	69.47	--	--	7.09	7.50	21.69	29.23	--
1961-62	71.75	--	--	27.81	8.51	21.64	--	30.04
1962-63	50.01	--	13.16	0.76	7.97	--	--	20.94
1963-64	56.76	24.12	14.79	10.45	9.19	--	--	--
1964-65	53.15	--	--	--	10.60	11.72	10.45	11.86
1965-66	61.28	--	--	--	9.06	16.68	25.79	--
1966-67	70.65	--	--	17.86	10.45	19.23	16.46	13.21
1967-68	60.43	--	--	--	10.45	14.93	25.43	--
1968-69	69.68	--	--	9.05	10.45	18.82	29.32	--
1969-70	69.68	--	--	9.06	10.46	18.81	29.32	--
1970-71	69.68	--	--	9.01	10.39	18.88	29.32	--
1971-72	69.73	--	--	9.51	11.13	18.15	29.34	--
1972-73	69.21	--	--	4.73	3.97	25.13	29.12	--
1973-74	74.22	31.54	26.90	50.23	4.58	--	--	--
1974-75	26.48	--	--	--	11.09	--	--	11.09
1975-76	30.53	--	--	--	12.78	--	12.85	--
1976-77	41.00	--	--	--	17.17	--	--	17.17
1977-78	52.96	--	--	--	--	22.29	10.91	11.32
1978-79	69.07	--	--	67.69	--	29.07	29.07	--

^{1/} Results for a simulated farm situation in northern Minnesota. It should be noted that all cattle were sold in 1979 to end the simulation.

^{2/} The steer calf, heifer calf, and cull cow sales occur in the first year listed; the replacement heifer, winter heifer, winter steer, and summer through October actions carry into the second year.

Source: Production/Marketing Alternatives For Northern Minnesota Cow-Calf Producers, Robert H. Craven and Paul R. Hasbargen, (M.S. Plan B Project Paper, Department of Agricultural and Applied Economics, University of Minnesota, April 1981).

Table 10 shows the estimated effect of hedging on cattle profits during the critical phase of the cyclical downturn in cattle prices during the 1970's. This was the only market break for which the futures markets were a realistic alternative. As expected, the analysis shows that hedging generally would have reduced profits on cattle sold in 1973, as this was the peaking year of the price cycle. However, some analysts thought that the cycle had already peaked in early 1973, so it is not unrealistic to assume that many producers might have hedged that year. When the break actually came in 1974, the value of hedging was demonstrated. Profits from hedging ranged from \$14.22 to \$15.84 per hundredweight for feeder cattle and from \$7.54 to \$8.78 per hundredweight for finished cattle.

If producers had continued to hedge during 1975, they generally would have reduced their profits by doing so. Given the absence of a futures market in earlier cycles, it is difficult to determine whether this is unique to the cycle of the 1970's or whether a price rebound is typical after the initial downturn. However, when the market turned and dropped again in 1976, hedging would have once again increased profits in most phases of the cattle business.

Overall, hedging shows a definite potential for allowing cattle producers to deal more effectively with the downturn phase of the cattle price cycle. Hedging during the entire critical turn period can help stabilize profits, although the hedged returns are

still unlikely to cover the full return to management available in better years. The biggest hedging gains were in the year of the actual break. Therefore, the astute market-oriented feeder cattle producer, using evidence available from the indicators, will be able to limit losses in future price break periods by judicious use of forward pricing--either through a broker or through a feeder cattle marketing firm. A combination production-marketing adjustment to a calf selling program just prior to the price break year, plus use of futures on any calves that are carried over to utilize excess forages, might be the most prudent strategy.

Liquidation and Rebuilding the Beef Herd

The alternative of severe culling prior to a big price break and then rebuilding a beef herd after a couple of years may be practical for some producers where forage acres have alternative uses or where a change in the basic beef breeding herd is desired, or both.

In this case, an individual would do well to watch the warning indicators closely and sell the older mature cows when cows are still in great demand for herd expansion. In the past, the year to sell was when all but one of the indicators were flashing warnings at the same time (1952, 1962, 1972). The rebuilding process can be started again with low-priced heifer calves bought during the liquidation phase of the cattle cycle.

Table 10. Cattle profits per hundredweight of animal produced, hedged and unhedged, 1973-76.

	<u>1973</u>	<u>1974</u>	<u>Dollars</u>	<u>1975</u>	<u>1976</u>
Cow Calf					
Hedged	9.77	- 8.33		-21.66	-13.26
Unhedged	14.66	-24.17		-21.16	-20.84
Gain from hedging	- 4.89	15.84		0.50	7.58
Calf Feeding					
Hedged	- 1.63	- 2.42		- 3.23	- 1.63
Unhedged	3.49	-11.20		8.52	- 5.49
Gain from hedging	- 5.12	8.78		-11.75	3.86
Summer Stockers					
Hedged	1.19	0.67		0.15	- 0.51
Unhedged	2.55	-13.55		5.28	- 7.55
Gain from hedging	- 1.36	14.22		- 5.13	7.04
Winter Stockers					
Hedged	- 1.37	0.57		- 4.20	- 3.82
Unhedged	8.33	-13.68		- 4.37	2.49
Gain from hedging	- 9.70	14.25		0.17	- 6.31
Cattle Feeding--Spring Sale					
Hedged	- 2.86	- 1.92		- 2.97	- 1.28
Unhedged	5.51	- 9.86		3.35	- 3.90
Gain from hedging	- 8.37	7.94		- 6.32	2.62
Cattle Feeding--Fall Sale					
Hedged	- 2.42	2.10		0.21	- 1.73
Unhedged	- 4.25	- 5.44		9.11	- 8.18
Gain from hedging	1.83	7.54		- 8.90	6.45

Bases used:

- Cow-calf: feeder futures + \$0.50 (steers & heifers)
- All cattle & calf feeding: \$0.00 basis assumed 1050-1100 lb ch. steers
- Summer stockers: feeder futures - \$0.75
- Winter stockers: feeder futures - \$1.50

-All futures prices from date nearest 15th of month for 3 month period, six months prior to delivery period.

Retaining Ownership

Another strategy for dealing with the major break in cattle prices that is available to cow-calf operators and stocker operators is to retain ownership of cattle that are showing a loss

during the initial downturn in the market by placing them in a feedlot. Comparison of the profit patterns from feeding programs shows that there is some tendency for the fall sale of yearling fed cattle (table 11) to offset losses

Table 11. Cattle feeding enterprise profits per hundredweight, Southern United States, 1949-78

<u>Year</u>	<u>Calf feeding</u>	<u>Dollars</u>	<u>Spring sale yearling feeding</u>	<u>Fall sale yearling feeding</u>
1949	+ 0.18		+ 0.96	+ 3.36
1950	+ 5.04		+ 3.64	+ 4.61
1951	+ 4.91		+ 7.57	+ 3.04
1952	- 0.67		+ 1.30	+ 0.81
1953	- 3.31		- 5.35	+ 0.55
1954	+ 0.44		+ 1.74	+ 1.44
1955	- 1.12		+ 0.05	- 1.27
1956	- 0.23		- 2.38	+ 3.62
1957	+ 2.87		- 0.47	+ 1.64
1958	+ 1.16		+ 3.59	- 0.67
1959	- 1.19		+ 0.30	- 1.98
1960	- 2.04		- 0.77	- 1.32
1961	- 2.73		- 0.99	- 0.96
1962	+ 0.13		- 0.12	+ 4.78
1963	- 3.74		- 4.55	- 2.09
1964	- 2.80		- 5.28	+ 1.18
1965	+ 2.19		+ 0.63	+ 1.75
1966	- 1.12		+ 0.72	- 2.53
1967	- 1.05		- 2.64	+ 0.08
1968	+ 0.14		- 1.19	+ 0.43
1969	+ 3.87		+ 2.97	- 1.68
1970	+ 0.03		- 0.38	- 3.30
1971	+ 0.01		+ 0.33	+ 0.91
1972	+ 1.97		- 0.05	- 0.82
1973	+ 3.49		+ 5.51	- 4.25
1974	- 11.20		- 9.86	- 4.14
1975	+ 8.52		+ 3.35	+ 9.11
1976	- 5.49		- 3.90	- 8.18
1977	- 5.00		- 4.42	- 3.54
1978	+ 5.30		+ 5.54	- 0.47

on the same cattle had they been sold the previous spring as winter stockers (table 7). The feeding profits shown in table 11 for southwest feeding programs were estimated in the same manner as those in table 7. However, in 1974 both winter stockers and fed cattle sold in the fall lost money.

There is often a similar offsetting relationship between profits on summer stockers and the same cattle sold the following spring as yearling fed cattle. Fed cattle sold in the spring of 1975 would have offset only a fraction of the loss on stockers sold the previous fall.

The potential for avoiding losses by extending ownership on calves sold in the fall is summarized in table 12. The profit figures are for the initial 2 years of each of the major downturns in cattle prices since 1949. The calf crops are matched with a calf feeding option and with a winter stocker and a fall sale of fed cattle option. This takes the same calves through the various options that may be associated with their ultimate slaughter. Notice that in all cases, at least one phase of production shows a profit. In all cases, except 1954, there would

have been some possibility of reducing the initial loss by retaining ownership. However, in only one year, 1965, were there sufficient profits in any further production phase to offset the initial loss on the calf crop.

Summary of Management Strategies for Cattle Cycles

The management tools discussed in this section can be useful to feeder producers in reducing the risks associated with cattle price cycles. The recommended production-marketing strategies are based on the profit patterns of past cattle cycles--specifically those of the last three cycles. Each cattle cycle is a little different; hence, what would have worked well in a previous cycle may not enhance profits as much in a future cycle. However, there has been enough uniformity in past profit cycles to place quite favorable odds on the expectations that the profit pattern will be sufficiently similar again in future cycles. (In fact, since 1974 some Minnesota producers have been using the cycle of the 1950's as a model for expectations in the 1970 cycle with a good degree of accuracy.)

Table 12. Profits per hundredweight for retained ownership alternatives

<u>Calf Crop</u>	<u>Cow calf</u>	<u>Calf feeding</u>	<u>Winter stocker</u>	<u>Cattle feeding-- fall sale</u>
<u>Dollars</u>				
1953	- 5.31	+0.44	+0.65	+1.44
1954	- 2.48	-1.12	-2.32	-1.27
1964	- 3.45	+2.19	+0.24	+1.75
1965	- 0.55	-1.12	+2.14	-2.53
1974	-24.77	+8.52	-4.37	+9.11
1975	-21.16	-5.49	+2.49	-8.18

The major findings of our studies of past profit patterns are as follows:

1. Cow-calf profits tend to be cyclical, with consistent year-to-year profits during the 6 to 7 year rising phase of the price cycle, followed by consistent year-to-year losses during the 4 to 5 year cyclical decline in prices. The largest cow-calf profits usually occur in the year or two

preceding the price break, immediately after which profits are usually their lowest.

2. Stocker operation profits tend to fluctuate throughout a cycle; but there is some tendency for profits to be positive early in the cycle, signaling a cyclical price upturn, and negative later in the cycle when prices are falling.

Four major management strategies are suggested for serious consideration by feeder producers:

1. Vary the proportion of cows and yearlings so that more stockers and fewer cows are wintered over in price break years. Losses will still occur in a price break year, but they are less than those with a specialized cow-calf operation.
2. Liquidate or sharply reduce the cow herd in or just before the price break year to reduce losses further, especially when there are alternative uses for their fixed resources.
3. Retain ownership through the feedlot to provide some opportunity to minimize cow-calf and stocker losses in the

price break year and the years immediately following. Any offsetting gains in feeding will seldom cover all losses.

4. Hedge in years when prices are declining. If the price break year can be accurately anticipated, a hedge would be very helpful. An error made in hedging too soon (before the break) could be costly, however.

In all of these strategies, a producer needs the tools to anticipate the price break. The indicators developed in the second section form one set of such tools. The tools will not give precise answers in the future; but, when combined with an appropriate strategy, they can help to reduce price risk and increase profits to the beef enterprise during the next cattle cycle.

